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ABSTRACT

An instructor's manual and student activity guide on small appliance repair are provided in this set of prevocational education materials which focuses on the vocational area of trade and industry. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide is organized into the following elements: title of activity, duration of activity (five to nine days), activity goals, four instructional objectives, related vocational clusters, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, answer key to student check point activities, and answer sheets and a check sheet to be duplicated). The student activity guide provides step-by-step instructions (narrative and illustrations) for completing each instructional objective (e.g., identify basic tools used in the trade, assemble a lamp, repair a toaster). At the end of each set of instructions is a student check point (evaluation activity). Two occupational descriptions for electrical appliance repairer conclude the document. (JH)

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T & I – SMALL APPLIANCE REPAIR

Kit No. 30

INSTRUCTOR'S MANUAL

Prepared by

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In Cooperation With

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Clemson University
Clemson, South Carolina 29631

1978

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TITLE OF ACTIVITY

Kit No. 30, T & I – Small Appliance Repair

DURATION

Main Activity – 3 to 6 days
Follow-up Activity – 2 to 3 days

GOALS

The student will identify the terms used in electrical repair work.

The student will identify and use the tools of the trade.

The student will troubleshoot, isolate, repair, and replace the defective units.

The student will have an awareness of the dangers of electricity and the proper work habits to use when dealing with it.

The student will develop a team approach to troubleshooting and repairing.

The student will know the importance of following directions.

INSTRUCTIONAL OBJECTIVES

Given a list of electrical terms, the student will properly identify the use of each in this trade.

The student will identify the basic tools to be used in the trade and their proper use.

Given step-by-step instructions, the student will assemble a lamp.

Given step-by-step instructions, the student will disassemble, isolate, and repair the components in a toaster.

VOCATIONAL CLUSTERS

T & I – Electricity

ACTIVITY IMPLEMENTATION

A. Activity Description

This is an activity for groups of two students. One will be the reader/checker while the other does the work, then the students will switch positions.

B. Safety

DANGER: Any work on electrical units must be done with unit unplugged from power source. Electrical shock can kill.

C. Materials Required

1. Audio Visual Equipment
   None
2. Technical Equipment
   13 screwdriver blades
   13 Phillips screwdrivers
   13 wire strippers
   13 needle-nose pliers
   13 toasters
   13 plugs
   13 lamp socket assemblies
   13 wooden lamp bases
   13 replacement elements
3. Expendable Materials
   5 light bulbs
   12-gauge lamp cord, 24 inches (60.96 cm) per student

D. Preparation Prior to Class

1. Reproduce student worksheets
2. Acquire light bulbs
3. Acquire electrical cord

E. During Class Session

INTRODUCTION – The small appliance repair course is designed to give you, the student, an insight into one of the career fields and a chance to do some work yourself. The basic rules are simple:

No horseplay
Do not plug unit in outlet unless the instructor approves it.
Electricity is dangerous – IT CAN KILL!

The last rule is probably the most important and cannot be stressed enough. *Do not play with electricity.*

TO THE TEACHER – After you have read the student's guide, you should observe the groups as they do their work. Keep spare parts on hand.

Upon completion of lamp project, plug in the unit and check it out. Students will observe to see if the lamp lights; if so, they will continue with the project. If the lamp fails to light, check out the assembly and give

pointers where appropriate.

On the second project, observe the students as they do the work. Tell them to use care and to take their time. A slip of a screwdriver could scratch, tear, or break the heating element in the toaster.

F. **Follow-up Activities**

1. Have students fill out VIEW Fact Sheet.
2. Students can bring in small appliances from home to troubleshoot. Repairs may or may not be accomplished due to particular problem with units, or no parts available.

ANSWER KEY

Instructional Objective I

1. Wire strippers
2. Needle-nose pliers
3. Common or blade screwdriver
4. Cross-point or Phillips screwdriver

Instructional Objective II

1. B
2. D
3. C
4. A
5. E

Instructional Objective III

1. Unplug or stop all electrical devices when working on them.
2. Don't carry tools in your pocket.
3. Don't plug in any electrical appliance without your instructor's permission.
4. Inspect all tools for damaged parts.

Instructional Objective IV

1. Socket
2. Light bulb
3. Wooden base block
4. Two-prong plug
5. No. 12 wire

MASTERS FOR DUPLICATION

VIEW Fact Sheet
Answer Sheet
- Checkpoint 1
- Checkpoint 3
- Checkpoint 4

Check Sheet 2

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. 1 2 3 4 5 I like it.

ANSWER SHEET

CHECKPOINT NO. 1

1. _____

2. _____

3. _____

4. _____

CHECKPOINT NO. 3

1. _____

2. _____

3. _____

4. _____

CHECKPOINT NO. 4

1. _____

2. _____

3. _____

4. _____

5. _____

CHECK SHEET NO. 2

1. ____	volt	A.	Something that slows down or stops the travel of electrons
2. ____	electron	B.	The pressure that enables electrons to travel
3. ____	ampere	C.	The amount or number of electrons that travel past a point at one time
4. ____	resistance	D.	The small unit of electrical energy
5. ____	electricity	E.	Something we use for energy in everyday life

T & I – SMALL APPLIANCE REPAIR

Kit No. 30

STUDENT
LEARNING ACTIVITY GUIDE

Prepared by

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INTRODUCTION

The small appliance repair course is designed to give you an insight into one of the career fields and a chance to do some work yourself. The basic rules are simple:

No horseplay.
Do not plug unit in outlet unless the instructor approves it.
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The last rule is probably the most important and cannot be stressed enough. *Do not play with electricity.*

GOALS

The student will identify the terms used in electrical repair work.

The student will identify and use the tools of the trade.

The student will troubleshoot, isolate, repair and replace the defective unit.

The student will have an awareness of the dangers of electricity and the proper work habits when dealing with it.

The student will develop a team approach to troubleshooting and repairing.

The student will know the importance of following instructions.

DIRECTIONS

This is an activity for groups of two students. One student will be the reader/checker while the other does the work, then the students will switch positions. Follow each step carefully. Do not write in this book.

PROGRAMMED TEXT

Instructional Objective 1

The student will identify the tools needed in this activity.

STEP 1 — This is a common blade screwdriver. It is used to operate screws with straight groove heads.

STEP 2 — This is a cross-point or Phillips screwdriver. It is used to loosen or tighten screws with cross-grooved heads.

STEP 3 – Needle-nose pliers are used for both cutting and forming operations with wire.

STEP 4 – Wire strippers are used to remove insulation from wire.

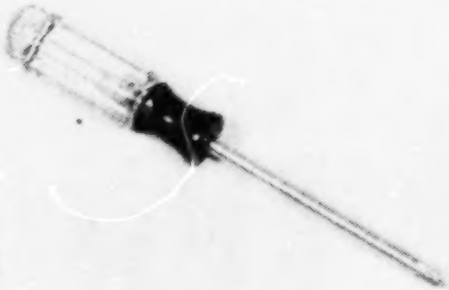
Check Point

Identify the following tools. Write your answers on the Answer Sheet for Checkpoint 1.

1

2

3

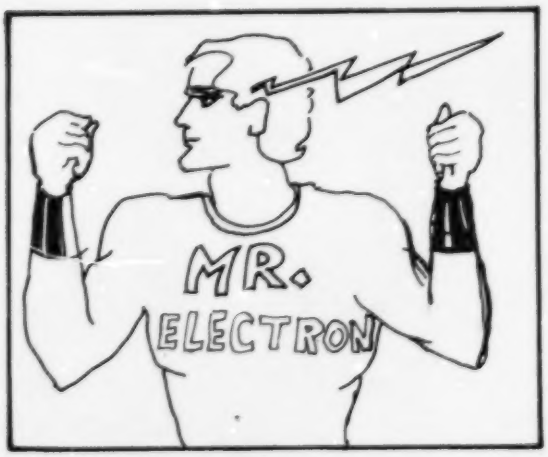


4

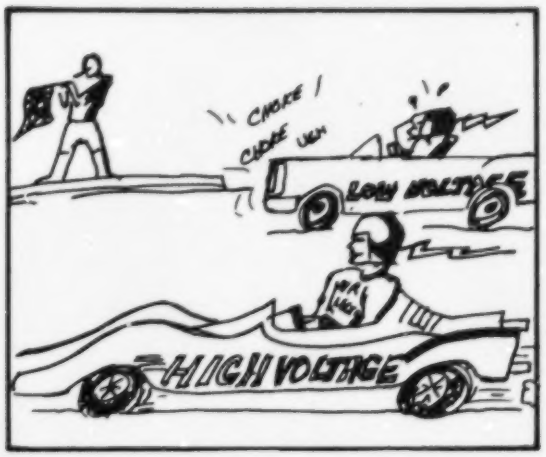
Instructional Objective II

The student will identify five basic electrical terms.

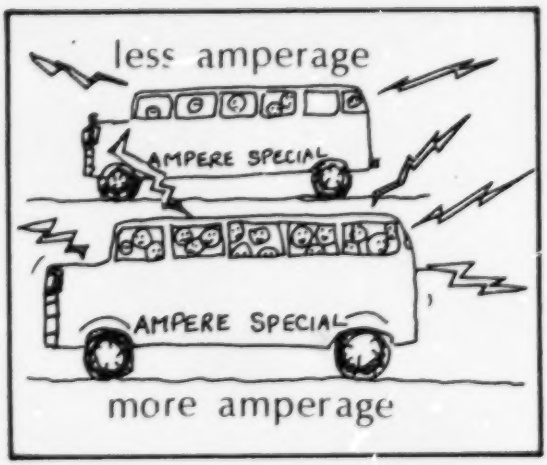
STEP 1 – Electricity is a form of power we are all familiar with because we use it in our everyday activities.



STEP 2 – Part of this electrical force is an electron. Electrons are small units of electrical energy.



STEP 3 – Electrons travel either slow or fast. The speed depends on the amount of voltage (volts) they have. Voltage is the pressure at which electrons travel.



STEP 4 – There is another term related to electrons. It is called amperage (Amps). Amps are the amount of electrons that travel past a given point.

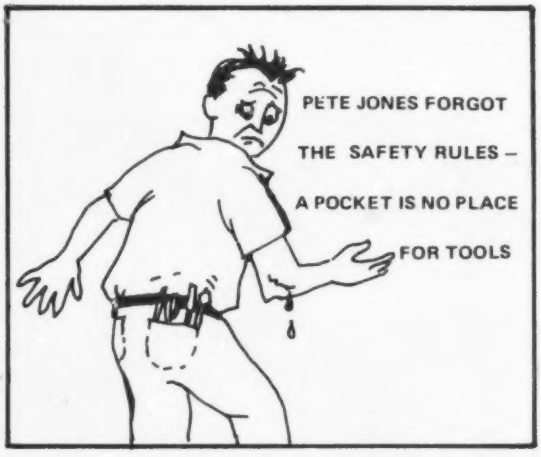
STEP 5 – Resistance is any object (device) which slows the path of the electrons. Examples of resistance include a light bulb, TV set, hair dryer, toaster, table saw, welder, or any item that uses electricity.

Check Point

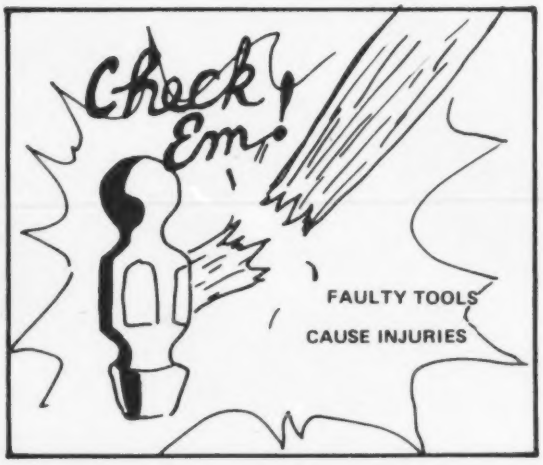
Obtain Check Sheet 2 from your instructor and fill in the matching column.

Instructional Objective III

The student will observe and list safety rules to follow while doing this activity.



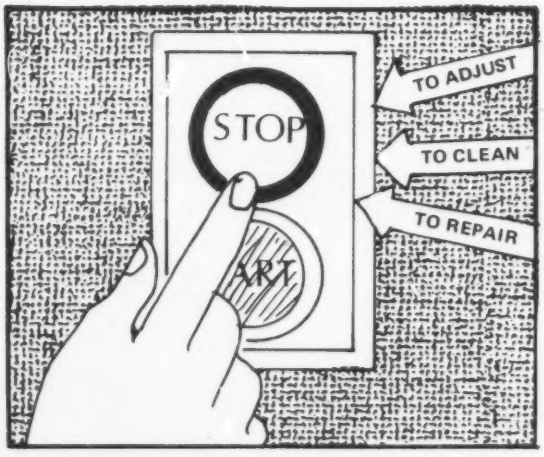
STEP 1 – Do not carry tools in pocket.



STEP 2 – Inspect all tools for loose or damaged parts.

13

STEP 3 – Do not plug in any electrical appliance without your instructor's supervison.

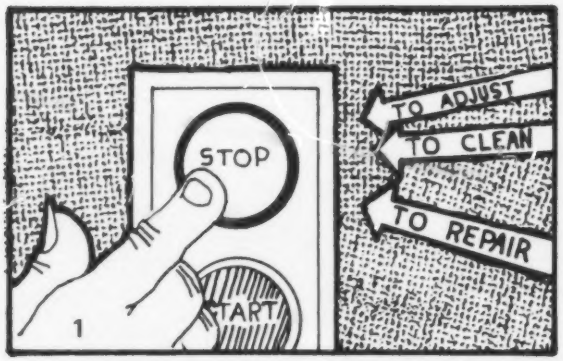


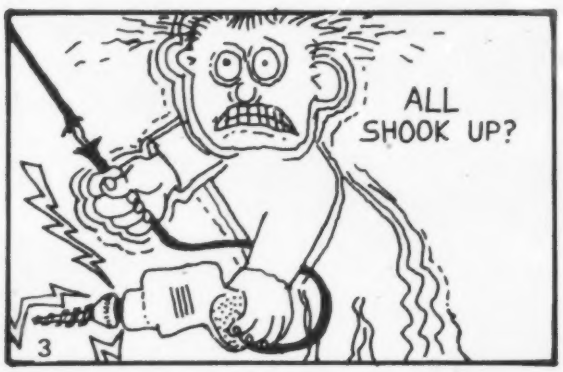
STEP 4 – Unplug or stop all electrical devices when working on them.

Check Point

Get the answer sheet for Check Point 3 and fill in your description (the proper safety rule) of the following pictures.

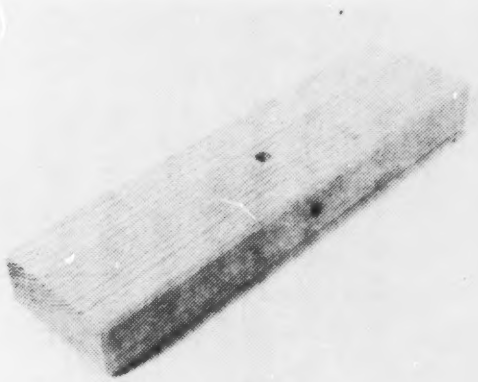
(See page six)





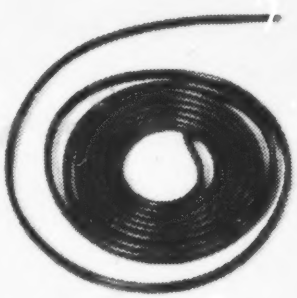
Instructional Objective IV

Two students will gather the necessary equipment needed to assemble a lamp. Work in groups of two.



STEP 1 – A wooden block is used for a base to hold lamp.

STEP 2 – Two-prong plug is used to plug into an electrical source.



STEP 3 – Coated No. 12 wire is used to carry electricity to the light bulb.

STEP 4 – This socket is used to hold the light bulb.

STEP 5 – The light bulb will be given to you by your instructor only after your assembly has been completed.

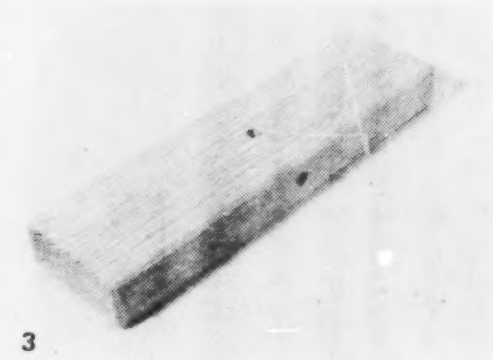
Check Point

Identify the following pictures on your answer sheet for Check Point 4. Check answers with your instructor.

(See page eight)

1

2



3

4

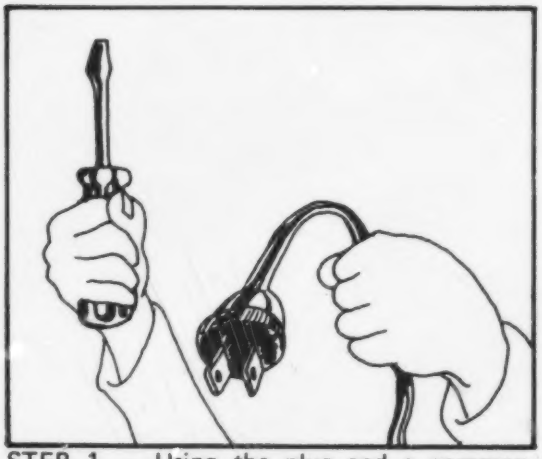
5

DIRECTIONS

With all of the parts in front of you, have one person read the directions while the other does the work. After you complete the work and the instructor has checked it, disassemble the unit and switch places. The worker (1st time) becomes the reader and the reader (1st time) becomes the worker.

Instructional Objective V

One student will strip the wire for the lamp kit.



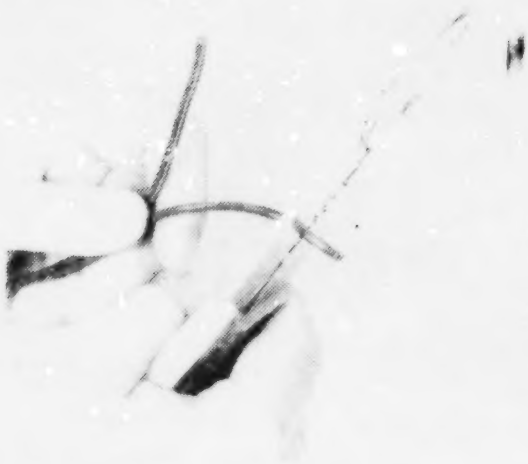
STEP 1 – Using the plug and a common screwdriver, loosen the two screws in the plug.

STEP 2 – To loosen the screws, turn counterclockwise.

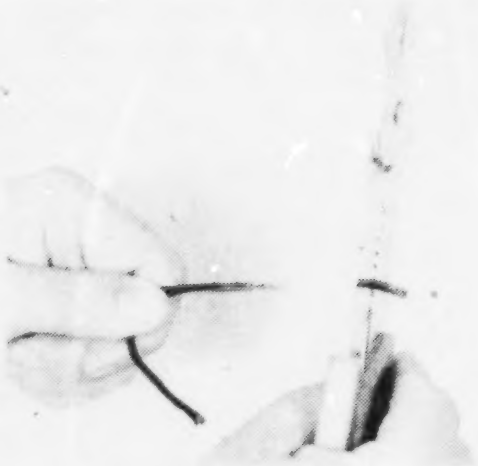
STEP 3 – Pick up the wire and cut the double wire into two strands.

STEP 4 – Pull wire 3 inches apart (7.62 cm).

STEP 5 – Place wire strippers ¾ inch (1.91 cm), or the length of your fingernail, in from the end of one strand of wire.



STEP 6 – Using the number 12 hole, squeeze the wire strippers on the wire.



STEP 7 – Pull insulation toward yourself, exposing bare wire.

STEPS

5 - 7

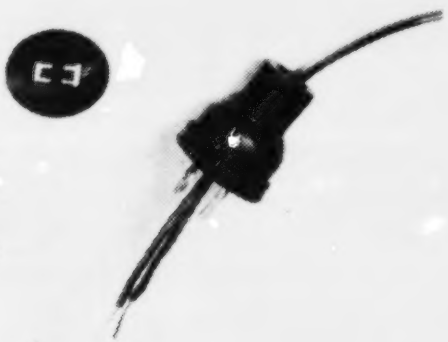
STEP 8 – Repeat steps 5 - 7 to other strand of wire.

Check Point

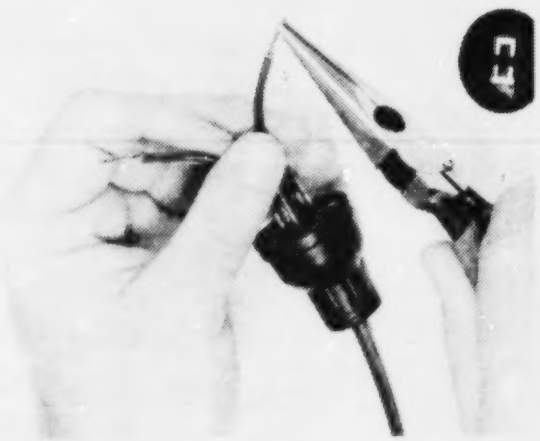
Have your partner examine wire to be sure insulation is removed from the end of both wires.

Instructional Objective VI

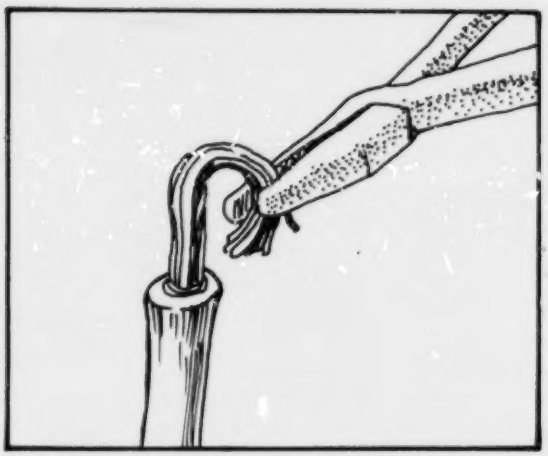
Using the needle-nose pliers, screwdriver, plug, and wire, the student will assemble the plug.



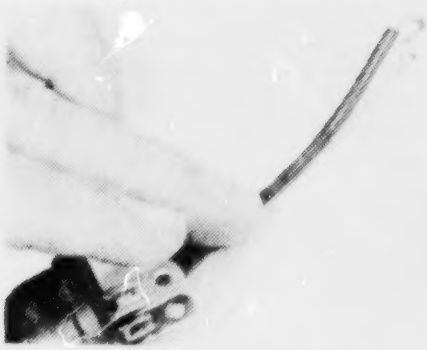
STEP 1 – Slide stripped wire through the center of the plug.



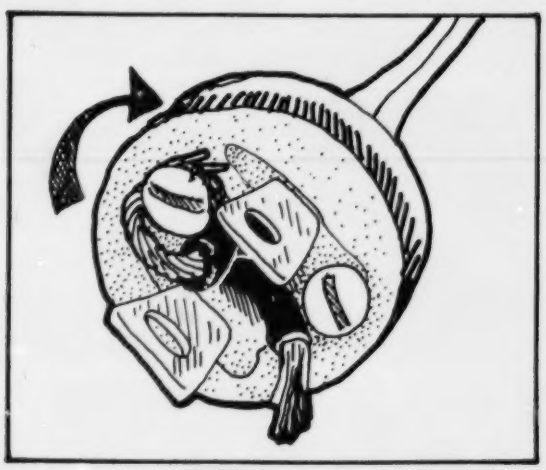
STEP 2 – Grasp one end of exposed wire with needle-nose pliers.



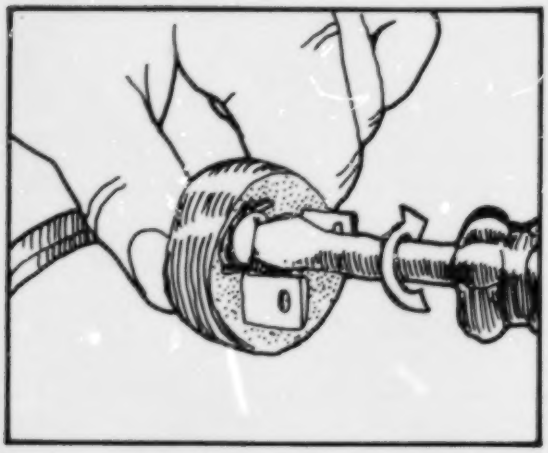
STEP 3 – Twist one turn clockwise so wire will look like a circle.



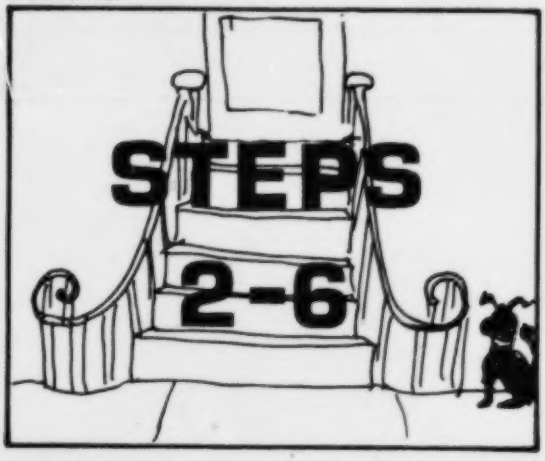
STEP 4 – Remove pliers. Be careful not to change the shape of the wire.



STEP 5 – Place wire under one of the open screws in plug.



STEP 6 – Using a common screwdriver, tighten screw on the wire until snug, turning clockwise.



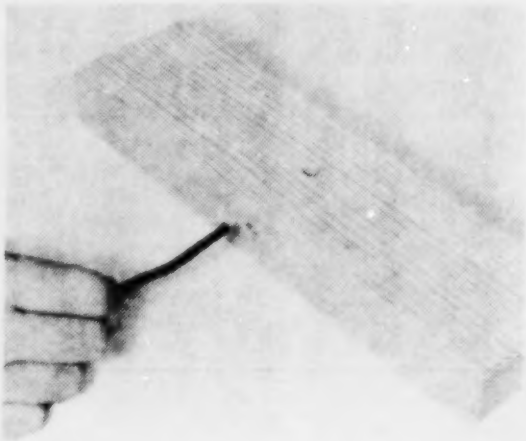
STEP 7 – Repeat steps 2 through 6 with the other wire for the plug.

Check Point

Have your partner inspect your work. Does it look like this picture?

Instructional Objective VII

Using a wooden block base, socket, pliers, screwdriver, and plug assembly, the student will assemble wire into base and socket.



STEP 1 – Push wire into hole of the base.

STEP 2 – Pull end of wire out of the block using the needle-nose pliers.

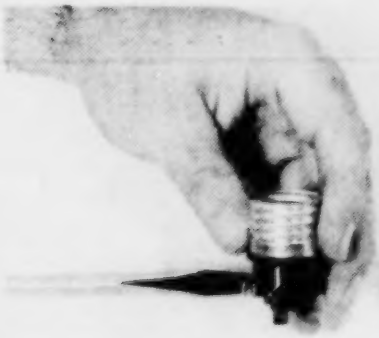
STEP 3 – Now you must take the socket apart (disassemble). Press on the sides of the socket and hold cap to pull socket apart.

STEP 4 – Slide wire through the threaded rod.

STEP 5 – Take the cap and put the wire through the center hole.

STEP 6 – Screw cap base into the block of wood by turning in a clockwise direction.

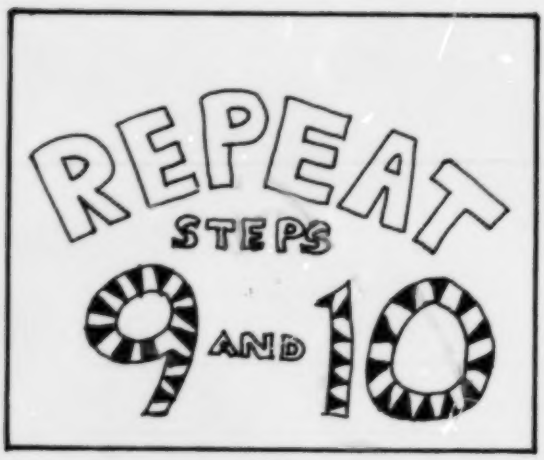
STEP 7 – Now strip the ends of the wire. Follow steps 3 through 8 in Instructional Objective V.



STEP 8 – Loosen the terminal screws.

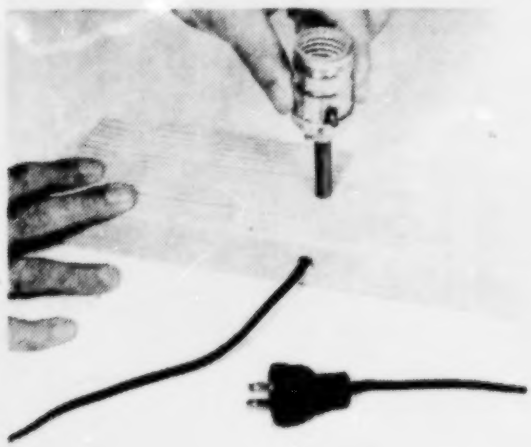
STEP 9 – Place one wire in terminal screw clockwise.

STEP 10 – Tighten screw in a clockwise direction.



STEP 11 – Repeat steps 9 and 10 with the other terminal screw.

STEP 12 – Now slide the insulation and outer shell over socket.



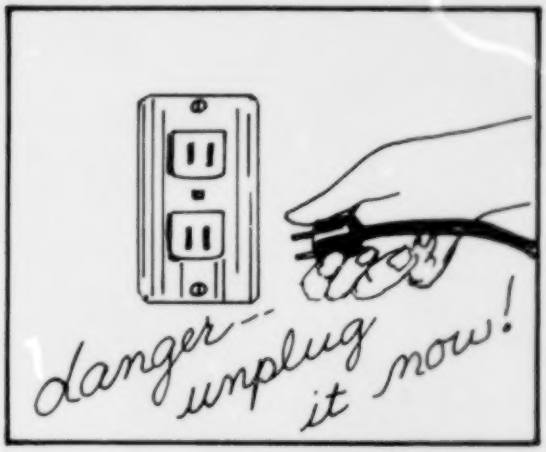
STEP 13 – Slide this assembled socket on the base.

Check Point

Have your instructor check your lamp for proper wiring. Then let your instructor place a bulb in the socket to test your lamp.

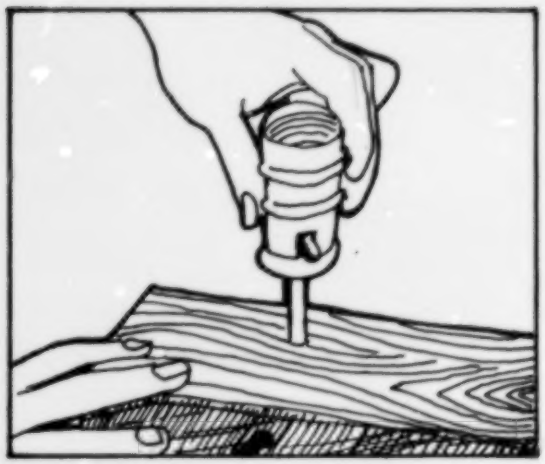
Instructional Objective VIII

After the lamp has been checked and operated, the students will change positions. The student who observed and checked the work will now take apart (disassemble) the lamp.



STEP 1 – Unplug the lamp!

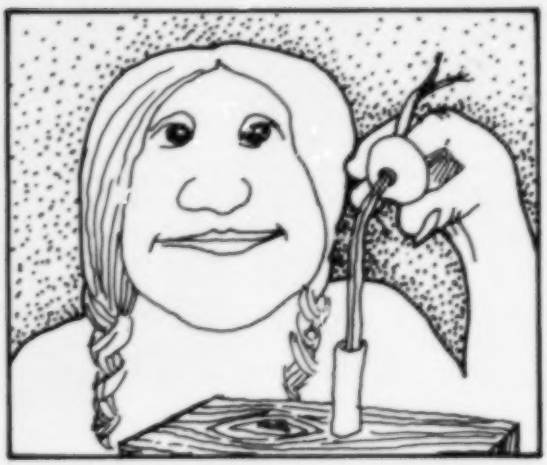
STEP 2 – Give light bulb back to your instructor.



STEP 3 – Squeeze side of outer shell of socket.

STEP 4 – Pull apart the four parts of the socket: shell, insulation, cap, and terminal connections.

STEP 5 – Unscrew terminal screws until wire connections come loose.



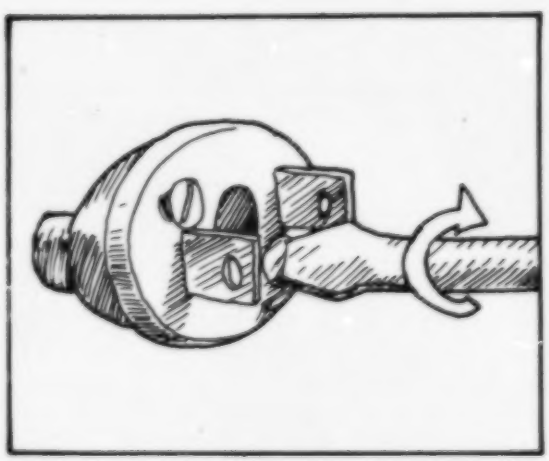
STEP 6 – Unscrew the cap from the base.

STEP 7 – Slide wire from cap and remove from the base.

STEP 8 – (Reassemble) Put the socket back together by putting insulation, shell, terminal, and cap together.

STEP 9 – Take the screwdriver and unscrew both screws that hold the wire to the plug.

STEP 10 – When they are loose, remove the wire by pulling it through the plug.



STEP 11 – Tighten both of these screws.

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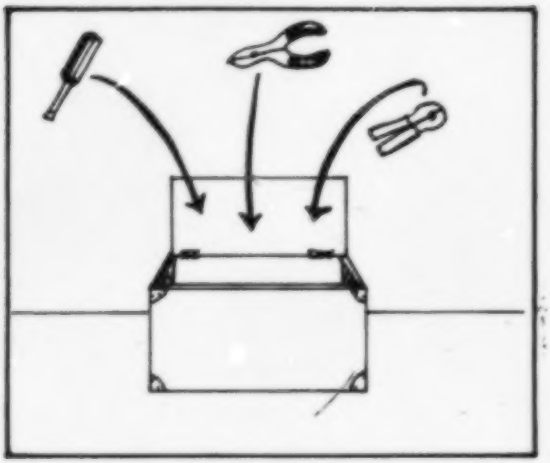
STEP 12 – Replace safety cover over plug.



STEP 13 – Return all materials.

Check Point

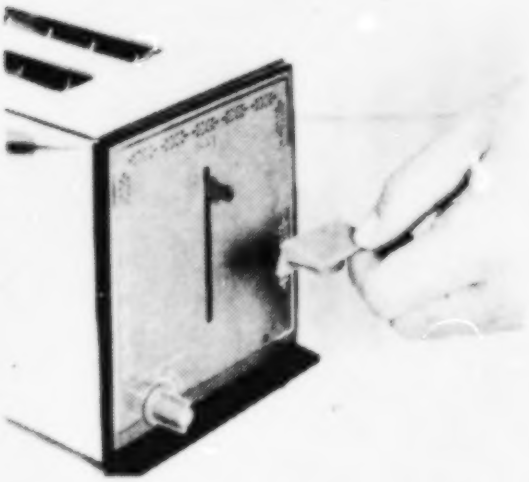
Have your partner check your steps and make sure all material has been returned to its proper place.

DIRECTIONS

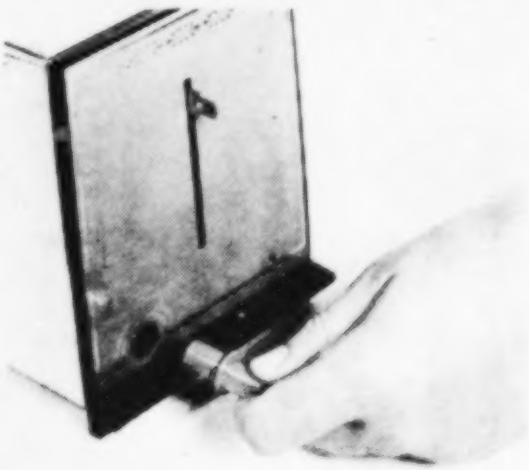
The students will continue to work in pairs. The student who put the lamp together (assembled) will do Instructional Objective IX.

Instructional Objective IX

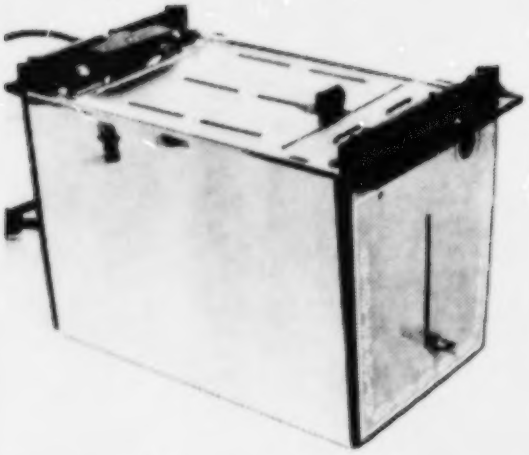
The student will take apart (disassemble) a toaster so the elements can be replaced. BE SURE THE TOASTER IS UNPLUGGED.



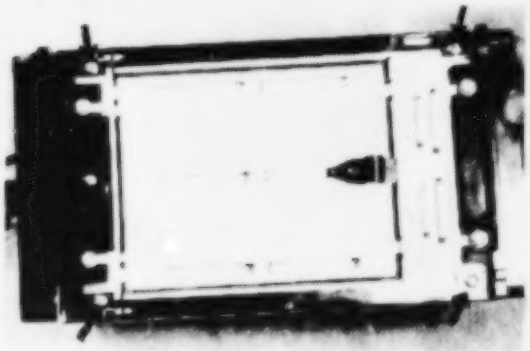
STEP 1 – Remove the toaster spring lever by gently pulling it toward you.



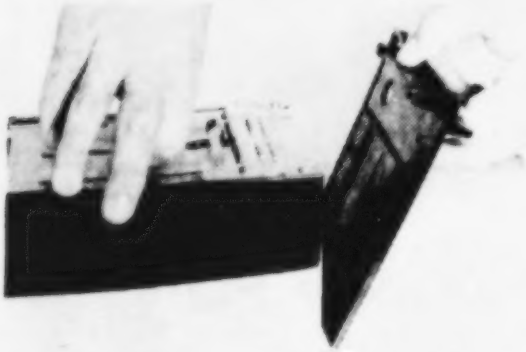
STEP 2 – Remove the lightness and darkness adjustment knob by pulling it toward you.



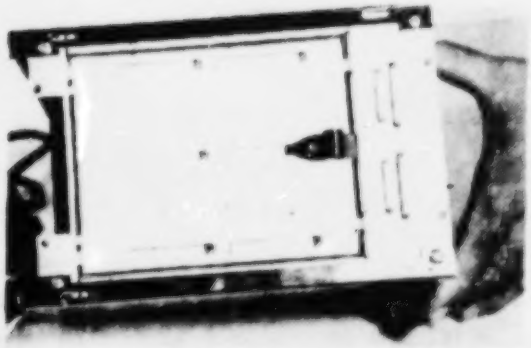
STEP 3 – Turn the toaster upside down. Don't worry if you hear a rattling noise. The sound is the bread guides falling out.



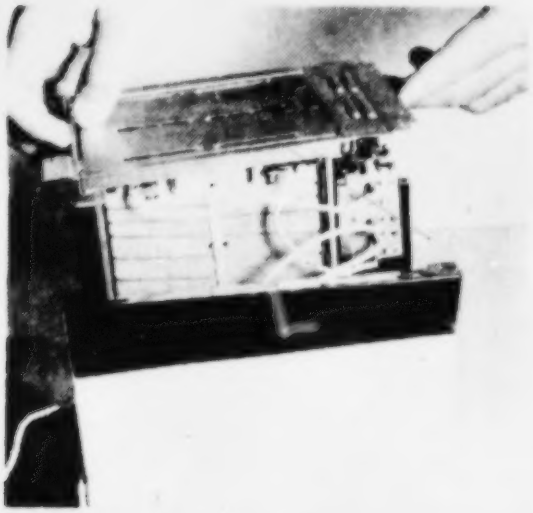
STEP 4 – Locate the four screws that secure the plastic end-plates to the toaster frame. Unscrew all four screws.



STEP 5 – Remove the two plastic end-plates by gently pulling up and out. Be careful not to pull out or put any pressure on the plate or you will permanently damage this appliance.

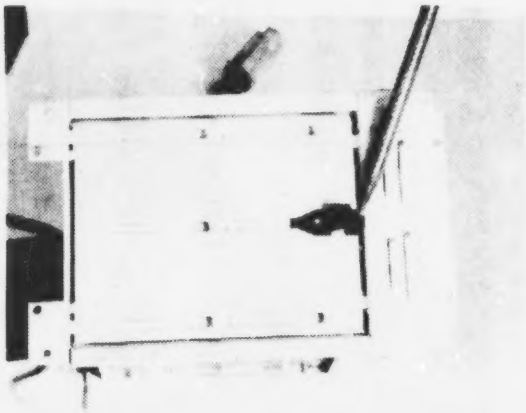


STEP 6 – Locate the four toaster cover screws. Unscrew these four screws.

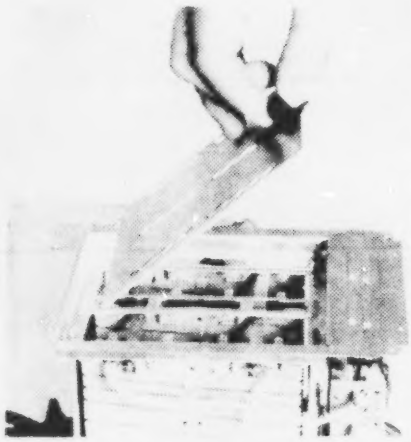


STEP 7 – Remove the toaster cover by lifting the toaster frame. At the same time all the bread guide rods should have fallen out of the toaster.

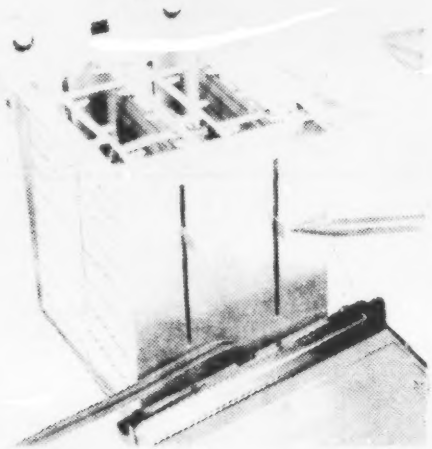
STEP 8 – Collect all these bread guide rods and place them to the side. There should be 16 rods.



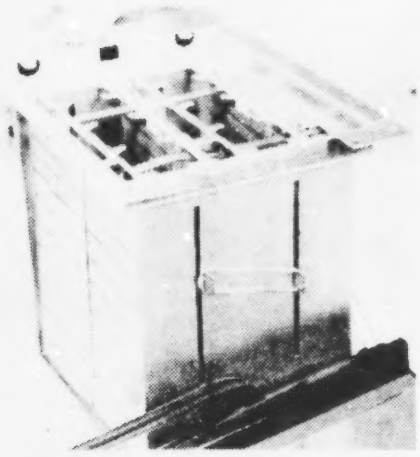
STEP 9 – Locate the crumb door release spring.



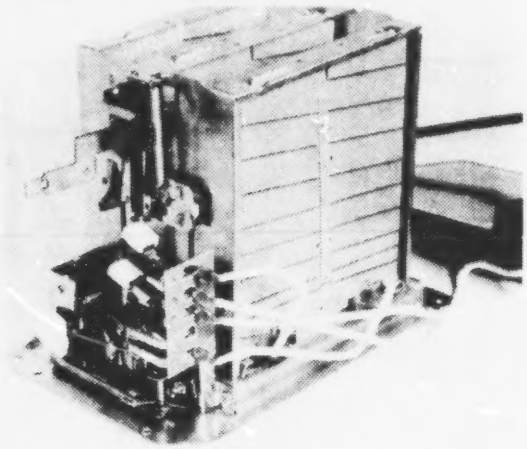
STEP 10 – Press this spring and lift up to remove.



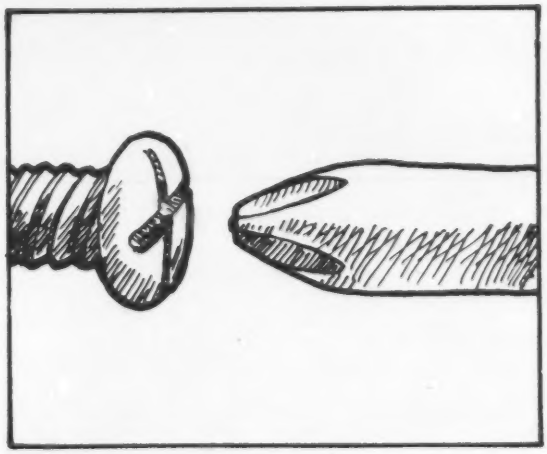
STEP 11 – Rotate your toaster to the side with two metal prongs.



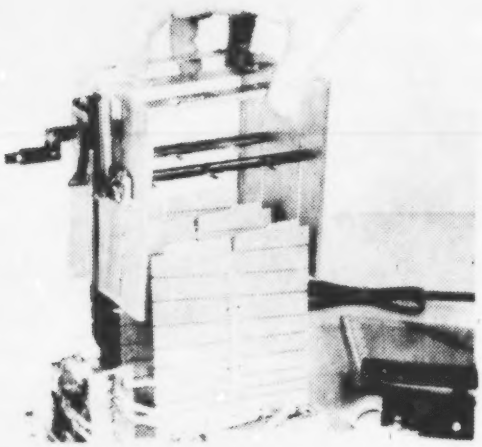
STEP 12 – Place a rubber band around the metal prongs to hold them in place.



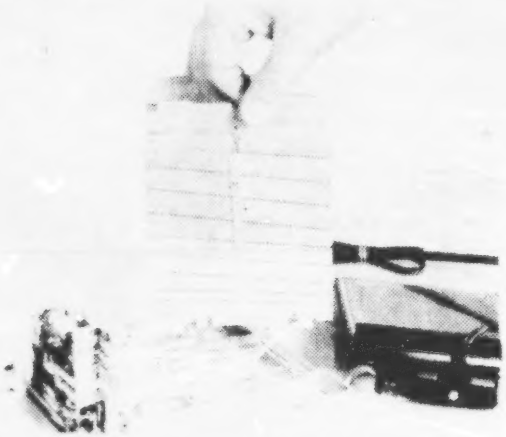
STEP 13 – Turn toaster right side up.



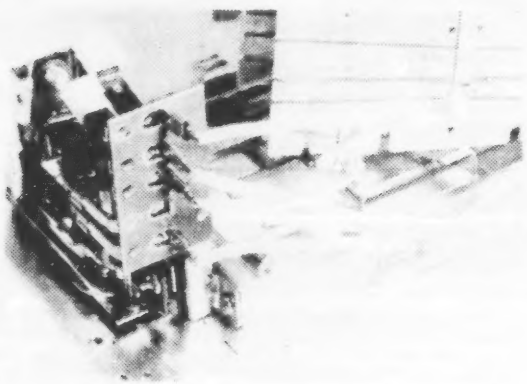
STEP 14 – Locate the four screws that hold the frame to the base.



STEP 15 – Remove these screws and remove the element frame from the toaster base.



STEP 16 – Remove element from base by lifting up and over.



STEP 17 – Disconnect the wire from the control unit. Gently pull the short wire from the top connector and gently pull the long wire from the bottom connector.

Check Point

Have your partner check your work.

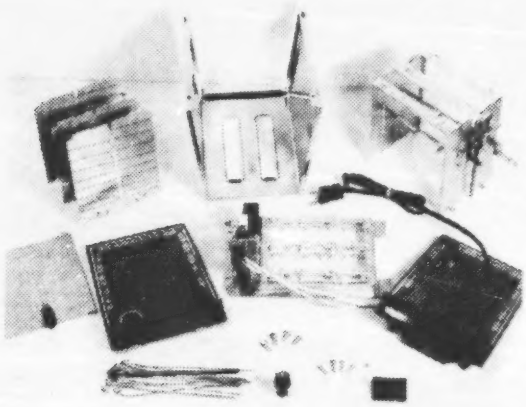
Are all the screws together?

Are all 16 guide rods in a neat pile?

Are both plastic knobs ready?

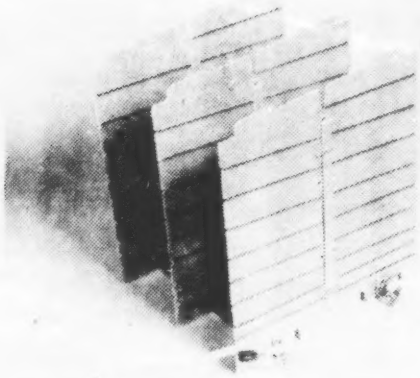
Are cover, base, plates, and frame in order to put the toaster back together?

If all these questions are answered "Yes," switch places and prepare to reassemble the toaster with a new element.

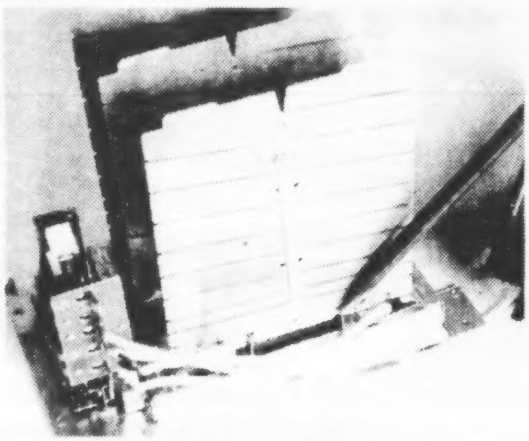


Instructional Objective X

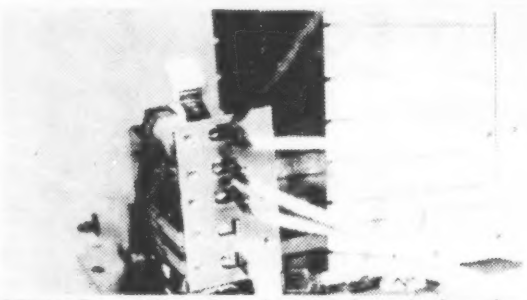
The student will repair the toaster by placing a new element in the toaster.



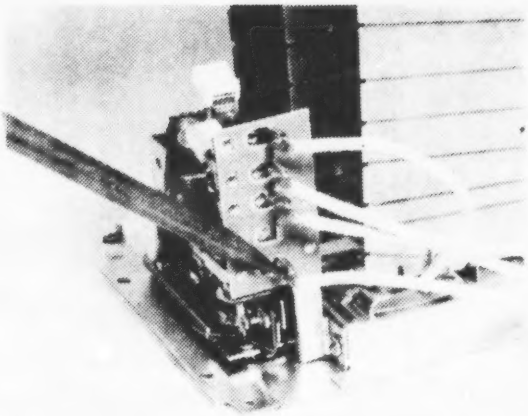
STEP 1 – Pick up the new element.



STEP 2 – Place the element on the toaster base. Be sure the center of all these elements fit into the center grooves on the base.



STEP 3 – Wire the element by placing the short wire on the top terminal. Push the plug over the slot; be sure this is on tight.



STEP 4 – Place this long wire on the bottom metal terminal by pushing tab until it is tight.

Check Point

Are both wires secure? (short wire to top tab, long wire to bottom tab.)

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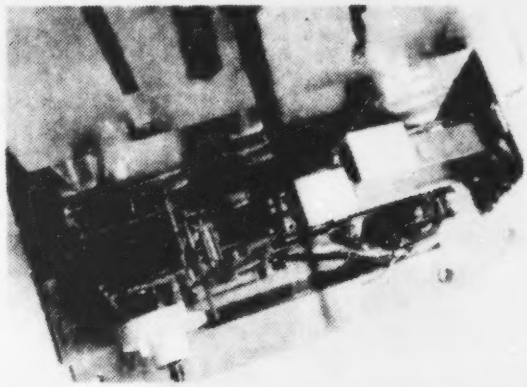
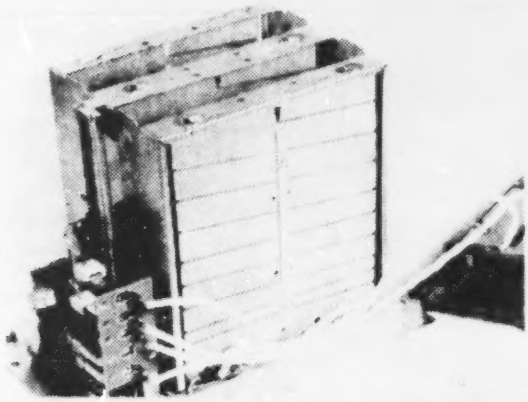
Instructional Objective XI

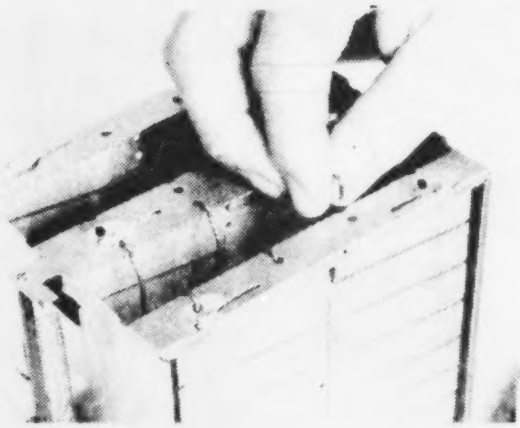
The student will assemble the repaired toaster.



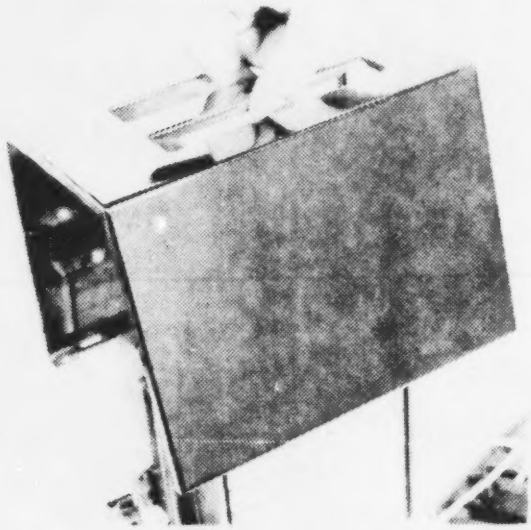
STEP 1 – Place the frame over the new element and on the base so that the four holes line up. Be sure the top of the three elements fit into the grooves of the frame. Locate the toaster spring lever in its proper hole.



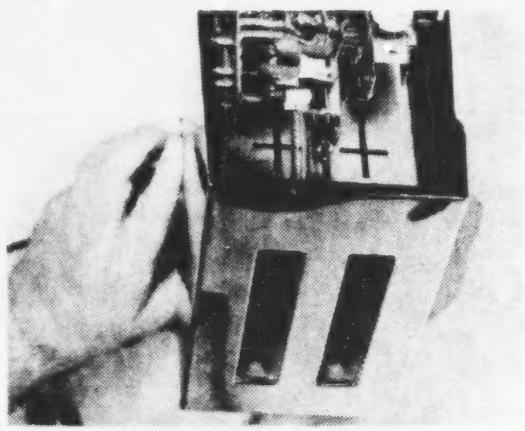
STEP 2 – Carefully screw the four screws to secure the frame to the base. (Have some patience with this as it will be a little difficult to keep all the parts together until you have all four screws on.)



STEP 3 – Place the sixteen bread guide rods in place. Be sure both ends are secure in a hole.



STEP 4 – Place the metal cover over the base and frame.



STEP 5 – Press the cover sides together.

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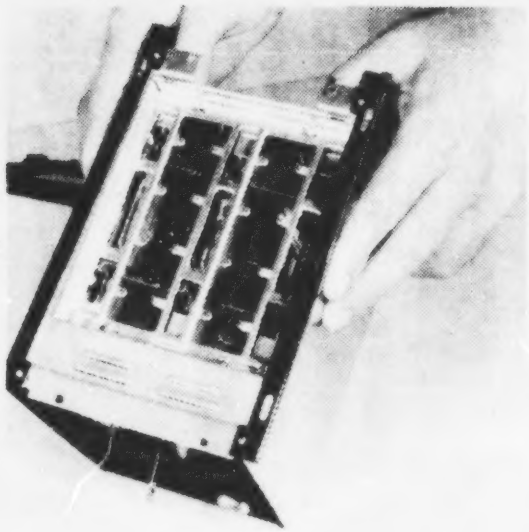
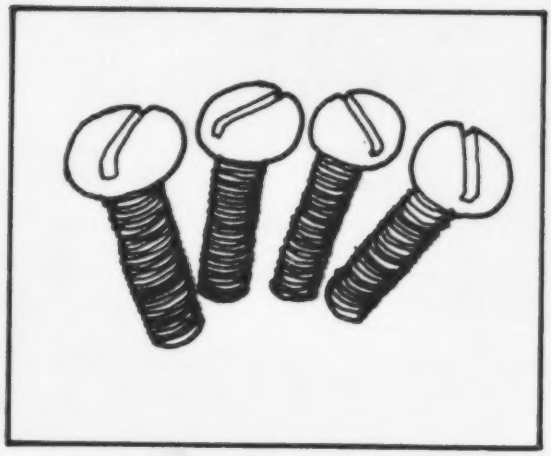
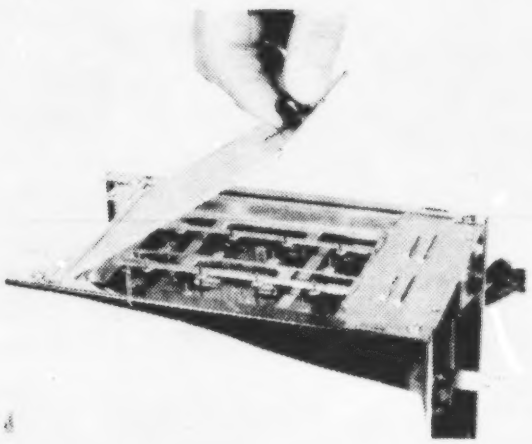


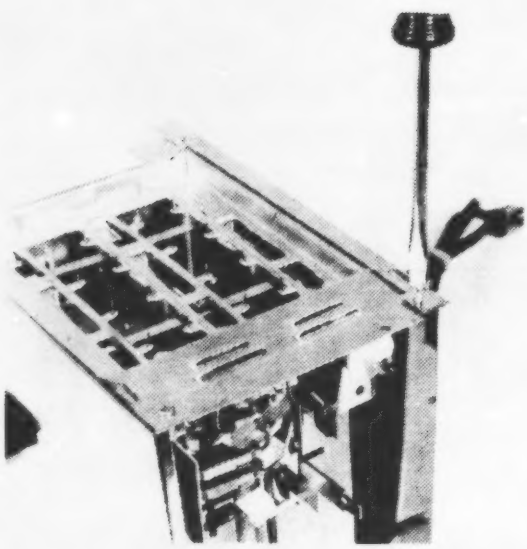
STEP 6 – While holding the sides together, turn the toaster upside down.



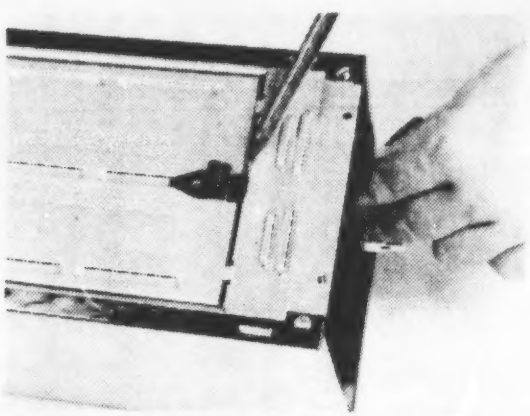
STEP 8 – Replace the four screws to secure cover to the toaster base.



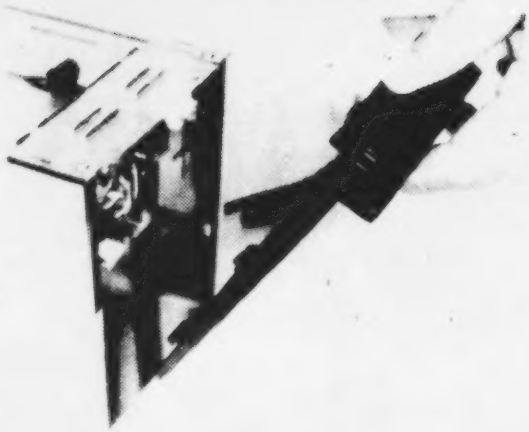
STEP 9 – Replace the crumb pan door by lining the two metal tabs in their proper slots.



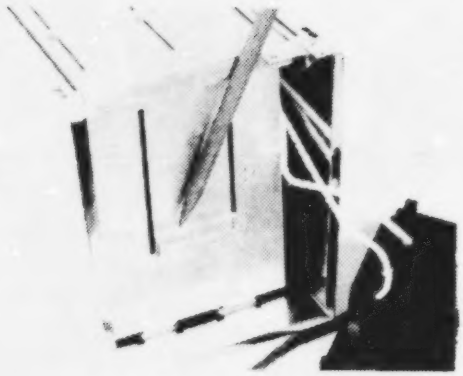
STEP 7 – Be sure the four holes that secure the cover to the base line up.



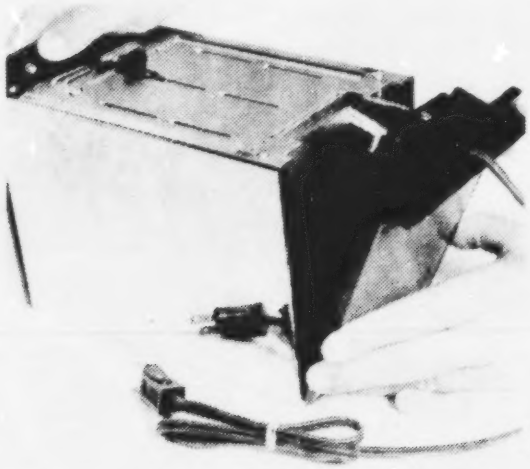
STEP 10 – Squeeze spring so door will shut on the bottom of the base.



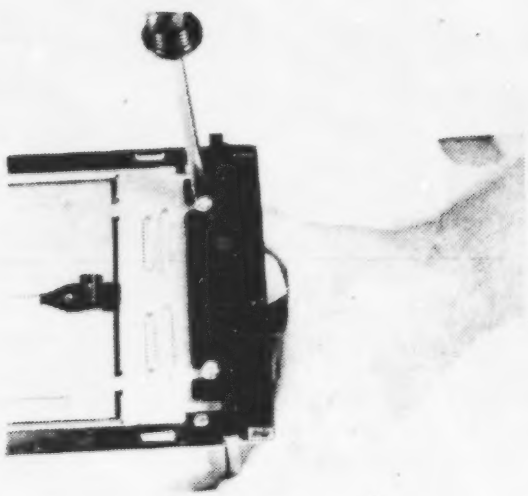
STEP 11 – Replace the end-plate with the slot in it. Place the two plastic tabs on the metal cover. Place the lever in the groove. Slide the plate to the toaster base until the bottom holes line up.



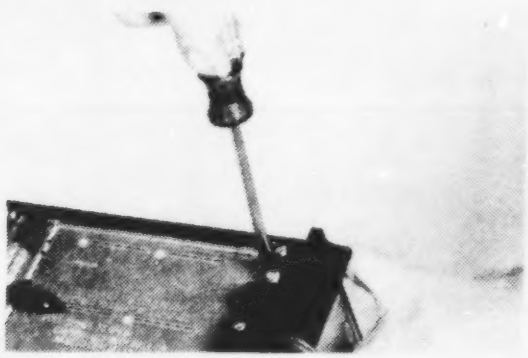
STEP 13 – Remove the rubber band holding the toaster prongs.



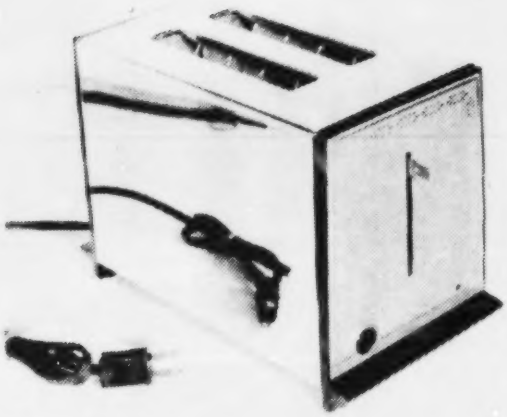
STEP 14 – Replace the plug and plate by placing the two plastic tabs on the metal cover. Slide the plastic up until the holes for the screws line up at the base. Be sure all wires are inside and the exterior cord is outside the toaster.



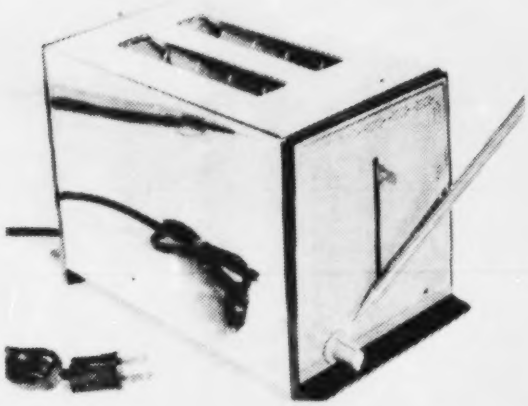
STEP 12 – Replace the two toaster screws.



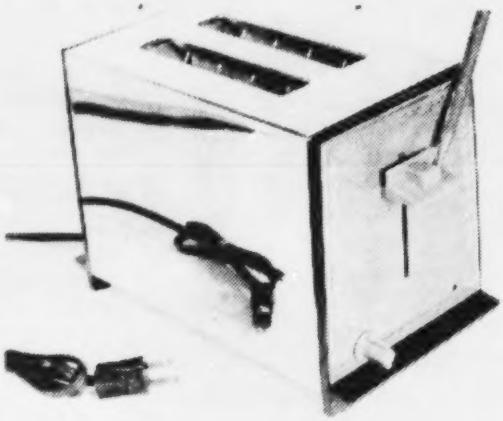
STEP 15 – Secure the end-plate with two screws.



STEP 16 – Turn the toaster right side up.



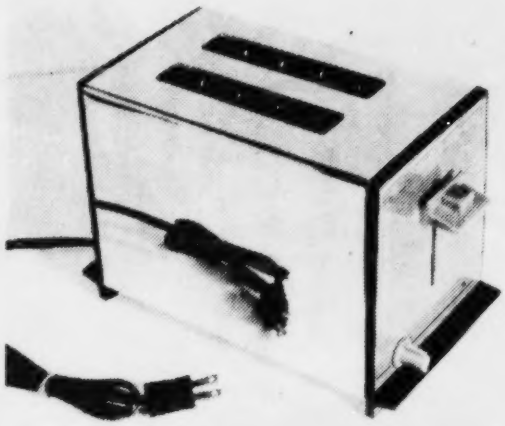
STEP 17 – Place lightness and darkness adjustment knob on the toaster by lining up the slot on the knob with the notch on the control and pressing them together.



STEP 18 – Replace the toaster spring lever by lining up the groove in the plastic handle with the metal tab and pushing them together.

Check Point

Does the toaster resemble the picture below?



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723.381-010 ELECTRICAL - APPLIANCE REPAIRER (any ind.) appliance-service representative; small-appliance repairer.

Repairs electrical appliances, such as toasters, cookers, percolators, lamps, and irons, using handtools and electrical testing instruments: Examines appliance for mechanical defects and disassembles appliance. Tests wiring for broken or short circuits, using voltmeters, ohmmeters, and other circuit testers. Replaces defective wiring and parts, such as toaster elements and perculator coils, using handtools, soldering iron, and spot-welding equipment. May compute charges for labor and materials. May assist ELECTRICAL-APPLIANCE SERVICER (any ind.) in repairing such appliances as refrigerators and stoves.

723.684-010 APPLIANCE REPAIRER (elec. equip.) repairer.

Repairs portable, household electrical appliances, such as fans, heaters, vacuum cleaners, toasters, and flatirons, on assembly line: Refers to inspector's checklist, or defect-symbol marked on appliance, to identify defective or malfunctioning part. Disassembles appliance to remove defective part, using power screwdrivers, soldering iron, and handtools. Installs new part, and reassembles appliance. Records nature of repair in log or on mechanical counting device. Maintains stock of replacement parts. May determine repair requirements by connecting appliance to power source or examining parts for defects while disassembling. May file or bend parts to remove burs, or to improve alinement and fit. May hold appliance against buffing or polishing wheel to remove scratches from metal surfaces. May touch up paint defects, using brush or spray gun. May be designated according to part repaired as HEATING-ELEMENT REPAIRER (elec. equip.); or appliance repaired as ELECTRIC-FRYING-PAN REPAIRER (elec. equip.); FOOD-MIXER REPAIRER (elec. equip.); TOASTER-ELEMENT REPAIRER (elec. equip.); VACUUM-CLEANER REPAIRER (elec. equip.).